

## THE CLAIMS

What is claimed is :

- 5           1.       A process for the manufacture of cooked cereals or dry pet food, which comprises preparing a mixture of water and a dry premix mainly comprising cereal flour or semolina, pressing the mixture using a gear pump comprising two toothed wheels which mesh with each other with the teeth being configured and dimensioned to avoid shearing the mixture as they mesh, with the gear pump forcing the mixture first into a heat exchanger and  
10       then through an extrusion die to form an extruded product; and cooking the mixture in the heat exchanger to provide a gelatinization degree of at least 85% before the mixture passes through the extrusion die; wherein the extruded product has properties which are similar to those of a roller dried product that is not subjected to stress during manufacture.
- 15           2.       The process of claim 1 wherein the gear pump is operated to impart organoleptic properties to the extruded product which are superior to those of an extruded product that is subject to pressure and friction while being cooked in an extruder.
3.       The process of claim 1 wherein the mixture is cooked to provide a  
20       gelatinization degree of at least 90% in the extruded product.
4.       The process of claim 1 wherein the product is extruded through the extrusion die to an expansion degree of 1.5 to 10.
- 25           5.       The process of claim 1 wherein the product is extruded through the extrusion die to an expansion degree of 2 to 6.
6.       The process of claim 1 wherein the mixture is prepared to provide a starch  
30       profile in the extruded product that is similar to that of a roller dried product that is not subjected to stress during manufacture and is characterized by respective proportions of 40-70% amylopectin, 5-22% intermediates and 15-35% amylose.
7.       The process of claim 1, which comprises preparing a mixture of water and the premix such that the mixture has a water content of 12-45%.

8. The process of claim 1 wherein the premix contains at least 70% of cereal flour or semolina.

5 9. The process of claim 1, which further comprises operating the gear pump to exert a pressure of (a) from 100 to 200 kPa upstream of the pump; (b) from 3,000 to 25,000 kPa upstream of the heat exchanger; and (c) from 2,000 to 10,000 kPa downstream of the heat exchanger.

10 10. The process of claim 9, wherein the gear pump is operated to exert a pressure of from 4,000 to 20,000 kPa upstream of the heat exchanger; and from 3,500 to 9,000 kPa downstream of the heat exchanger.

15 11. The process of claim 9, wherein the gear pump is operated to exert a pressure of from 5,000 to 16,000 kPa upstream of the heat exchanger, and from 4,000 to 8,000 kPa downstream of the heat exchanger.

20 12. The process of claim 1, wherein the mixture is cooked by progressively heating it to 90-180°C for 2 to 15 minutes as the mixture passes through the heat exchanger.

25 13. An apparatus for the manufacture of cooked cereals or dry pet food, which comprises, in series, a mixing device for preparing a mixture of water and a dry premix mainly comprising cereal flour or semolina, a gear pump comprising two toothed wheels which mesh with each other with the teeth being configured and dimensioned to avoid shearing the mixture as they mesh, with the gear pump located downstream of the mixing device and operated for forcing the mixture through the apparatus, a heat exchanger downstream of the gear pump for cooking the mixture, and an extrusion die forming an outlet of the apparatus for extruding the cooked mixture as an extruded product.

30 14. The apparatus of claim 13 further comprising an inlet hopper for introducing the water and dry premix into the mixing device; and a cutting device operatively associated with the extrusion die for cutting the extruded product into predetermined smaller length segments.

15. The apparatus of claim 13, wherein the gear pump is operated to exert a pressure of (a) from 100 to 200 kPa upstream of the pump; (b) from 3,000 to 25,000 kPa upstream of the heat exchanger; and (c) from 2,000 to 10,000 kPa downstream of the heat exchanger.

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16. The apparatus of claim 15, wherein the gear pump is operated to exert a pressure of from 4,000 to 20,000 kPa upstream of the heat exchanger; and from 3,500 to 9,000 kPa downstream of the heat exchanger.

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17. The apparatus of claim 15, wherein the gear pump is operated to exert a pressure of from 5,000 to 16,000 kPa upstream of the heat exchanger, and from 4,000 to 8,000 kPa downstream of the heat exchanger.

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18. The apparatus of claim 13, wherein the mixture is cooked by progressively heating it to 90-180°C for 2 to 15 minutes as the mixture passes through the heat exchanger.

19. A cooked cereal product or dry pet food obtainable by the process of claim 1.

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20. A cooked cereal product or dry pet food according to claim 19, which has one or a combination of the following properties:

organoleptic properties which are superior to those of an extruded product that is subject to pressure and friction while being cooked in an extruder.

an expansion degree of from 1.5 to 10;

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a gelatinization degree of at least 85%;

a starch profile that is similar to that of a roller dried product that is not subjected to stress during manufacture and that is characterized by respective proportions of 40-70% amylopectin, 5-22% intermediates and 15-35% amylose; and

a water content of 12-45%.

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